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Traffic Engineering

Official Publication of the Institute of Traffic Engineers

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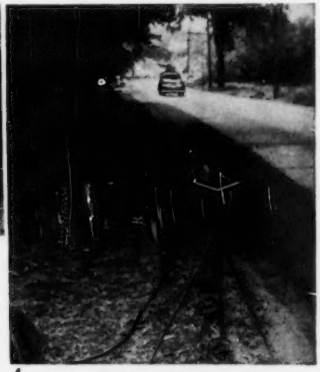

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Traffic Engineering

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COVER: Scale model of proposed intersection redesign in Honolulu, Hawaii. Note article by George K. Houghtailing.

Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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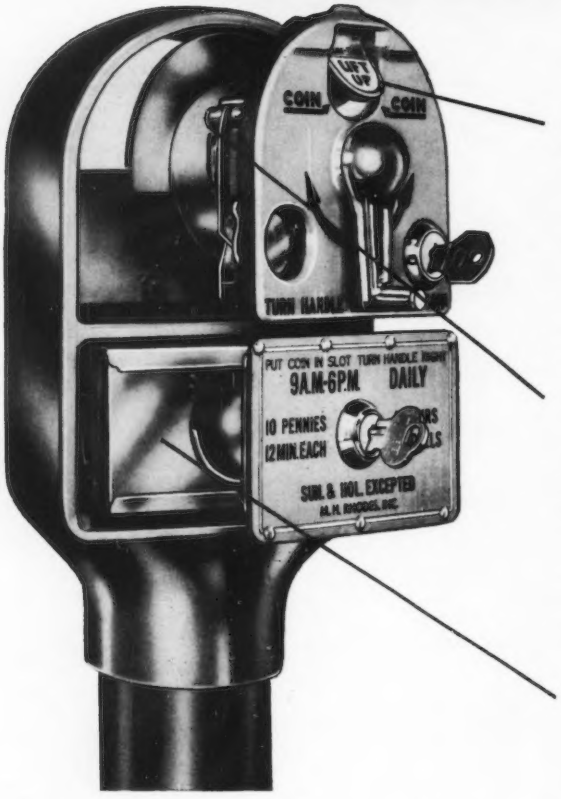

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LETTERS TO THE EDITORS

The Capacity of a Highway

I would like to challenge the assumption which underlies Dr. Hess's article on highway capacity in your August issue. His mathematical derivations are beyond approach, but an unrealistic assumption leads him to the conclusions that (1) a lane has its maximum capacity at about 15 m.p.h., and (2) the capacity at 60 m.p.h. is only about half the maximum value.

Dr. Hess assumes that a "safe distance" between two cars must be long enough to permit the rear car to be stopped by its brakes *even if the front car should stop "on a dime."* We would undoubtedly have fewer rear-end collisions if more people drove this way. However, the evidence seems to indicate that the rear driver realizes that the front car has a braking distance about the same as his own, and he therefore deems it sufficient if the clear space in front of him allows enough time for him to notice the front car's deceleration and get his foot on the brake pedal. It would be well for him to leave some additional space, just in case the front car's brakes or tires are better than his, but there are not many drivers with that much foresight.

Thus the kv^2 term disappears from Dr. Hess's equations, and the capacity varies only slightly with speed (except at low speeds where the length of a car becomes important). This conclusion is in accord with the field research of O. K. Normann, who has shown—see Fig. 3 in the Highway Capacity Manual—that the capacity of a lane reaches its highest value at about 35 m.p.h. and differs from that value by less than 15 per cent for all speeds between 20 and 60 m.p.h.

MORTON S. RAFF

Bureau of Public Roads
Washington, D. C.

It was very interesting to read your criticism of my article "The Capacity of a Highway."

The term kv^2 in my formula could be left out only if one could assume that all cars have exactly the same braking distance. Mathematically it is clear that if we neglect kv^2 there would be no optimum speed at which a maximum capacity of a road is achieved.

However, we cannot assume that the car ahead has the same braking distance. And even if it were so we must not forget that there is always the possibility that the stoplight of the car ahead is not functioning or that the car has no stoplight (there are still such cars on the road).

Therefore, the careful driver will always have to allow for unsignalled sudden stopping of the car ahead. On account of this I could not agree to eliminating the term kv^2 in my formula altogether.

The field research of O. K. Normann (Highway Capacity Manual, Fig. 3) has shown that there is a maximum capacity of about 2000 cars per lane and per hour, at a speed of 30 to 35 miles per hour, followed by a slight 10% decrease up to 60 m.p.h. This is a clear indication that in reality there is a flat maximum which physically can only be explained by the kv^2 term.

Mr. Theodore T. McCrosky of New York City in a private communication has suggested to me to introduce smaller numerical values of k (according to the possibly different braking power of the two cars following one another). This leads to figures of the road capacity of 2000 cars per lane per hour and to optimum speeds which are close to the 30 m.p.h. obtained experimentally.

DR. VICTOR F. HESS

Physics Department
Fordham University
New York 58, N. Y.

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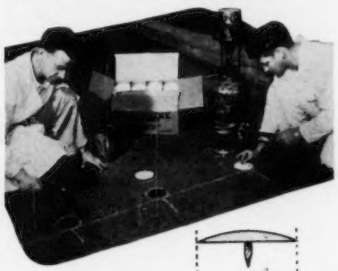

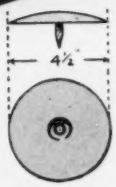

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Frankly Speaking

YOUR Board of Direction, at its last meeting, adopted two resolutions which should be of considerable interst to every ITE member. One resolution created the ITE Technical Council; the other launched the Traffic Engineer's Reference Notebook.

The Technical Council, through its secretary, the Research Coordinator, will integrate the activities of the six major ITE Technical Committees, review their contributions and submit completed, acceptable projects for adoption by the Board of Direction as ITE Technical Bulletins, American Traffic Engineering Standards, and continuing contributions to the Reference Notebook. Incidentally, the Council will relieve the Board of Direction of the labor involved in technically reviewing individual ITE committee reports and free its time for the consideration of increasing administrative matters. At the same time, the Board will still retain control over policy matters contained in ITE technical publications.

The Traffic Engineer's Reference Notebook is to be a continuing ITE project, a constantly expanding but an ever up-to-date loose-leaf reference volume. It will contain the best thinking on the science and art of Traffic Engineering distilled out of the collective experiences of practicing traffic engineers. The material it will contain will be limited to non-controversial, commonly accepted traffic engineering principles and practices, set forth in simple, brief, concise and compact tabular and graphic forms with a minimum of explanatory technical matter. The notebook will be kept fresh and alive through periodic reviews that will constantly prune out obsolete data and replenish it with up-to-date material developed by current research. It should eventually become every traffic engineer's indispensible ready-reference desk companion.

For these two new powerful tools—your Technical Council and your Reference Notebook—to give you maximum service, you yourself must be willing to contribute your services to them. Eventually, they will pay off large dividends in services to you, far greater than merely the sum of your individual contributions. Therefore, at the earliest convenience, every member should do these two things:

1. Write Bud Yost, Secretary of the Technical Council, and offer your services as a member of one of a number of sub-committees of the six major Technical Committees, describing briefly the types of contributions you can best make by virtue of your background and your past and current experience. Bud will see that you are allocated to the sub-committee that can best utilize your services and you will thus be integrated into the ITE committee structure, and become a part of the working force of the Technical Council.

2. Out of your personal technical scrapbook in which you keep a record of your trade secrets, select some piece of information that you have found most helpful to you in your profession and to which you have referred most frequently, or some practice you have found successful; express it in tabular or graphic form or into a statement of a principle or a practice; transcribe the material compactly onto one 8½ x 11 sheet and send it to Bud Yost as your individual contribution to the Reference Notebook, now "aborning." Note thereon the original source of any published data and your name, as the contributor, so that credit may be given both. After this material has been reviewed by the Technical Council, it will eventually be incorporated as part of the Reference Notebook.

ITE Members—it's up to you. LET'S GO! Your Technical Council is RARIN' TO GO!

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Intersection Redesign

By George K. Houghtailing (Mem., ITE)
Executive Secretary and Chief Planning Engineer
City Planning Commission, Honolulu, Hawaii

THERE HAS BEEN much discussion over a period of years as to a possible solution for the traffic congestion occurring at the intersection of School, Emma, Lusitana, Iolani, and Magellan Streets in Honolulu (Fig. 1).

Traffic converging from six different directions creates one of the most congested intersections in the city from the standpoint of multiple traffic movements. The small area of the existing intersection is traversed by twenty separate traffic paths. The cross pattern of these paths involves 49 conflict points.

Analysis of the traffic tabulations shows heavy traffic-interchange between School Street and Lusitana during peak morning and afternoon hours.

There are also indications of curtailed interchange activity (1) between School Street and Iolani-Magellan Streets, and (2) along Lusitana Street. It is suspected that much traffic that would normally travel through this intersection is avoiding it because of bottleneck conditions at peak hours.

This intersection represents one of the weak links in the cities' major thoroughfare street system as illustrated by the following functions of the intersecting streets:

1. School Street is presently one of the major cross-town thoroughfares serving the western part of the city.
2. Iolani Street and Magellan Street connect with major residential areas to the east.
3. Lusitana Street connects with civic center (south) and residential areas to the north.
4. Emma Street connects directly to the business district. This street is not carrying the traffic it should because of the congested condition at this intersection.

Traffic facilitation at this intersection will encourage greater use of the contributing streets, thus furnishing a measure of relief to other crowded streets.

Traffic Data

Traffic counts show a volume of 28,469 cars per 24-hour day entering this intersection. There are six main streams of traffic passing through the intersection:

	24-Hr. Vol. (cars)	%
1. School Street-Right Turn to Lusitana	5120	18.0
2. Lusitana Street-Left Turn to School	4100	14.4
3. Lusitana Street Straight North	3100	10.9
4. Lusitana Street Straight South	2730	9.6
5. Iolani Street to School	3220	11.3
6. School Street to Iolani	3160	11.1
	21430	75.3

Fig. 1

The six lines of traffic listed above constitute 75.3% of the total traffic entering the intersection.

There is also a secondary flow along Emma-Lusitana Streets as follows:

1. Emma Street to Lusitana North	1060 cars	3.7%
2. Lusitana Street-Right Turn to Emma	1270 cars	4.5%

The remaining directions of flow are minor, ranging between 19 to 776 cars per day.

Accident Data

From 1946 to the present date, there have been 45 accidents at this intersection involving 16 personal injuries.

Design Considerations

1. *Channelization alone vs. vertical separation*

Since none of the intersecting streets can be conveniently made one-way without creating other problems, the solution resolves itself into either a channelization problem, with two phase traffic light signals, or a separation of grades vertically.

In studying the intersection, it appears that flow preference is best assigned to traffic between the School-Lusitana Street alignment and on Lusitana Street going straight north. These traffic movements through the intersection total 12,320 cars per 24-hour day, representing 43.3% of the total flow passing through this intersection. The elimination of this large percentage from the six main streams of traffic will provide for better surface movement for the remaining traffic flow.

After due consideration of the various types of channelization, both at grade and vertical separation, it was concluded that the underpass type of construction, as noted on the model (Fig. 2) favoring the 43% traffic entering the intersection would provide a workable solution. Some questions arose in the mind of those who have reviewed the model that due consideration was not given to the possible signalization of this intersection. That phase of the solution was thoroughly reviewed and it was concluded that a three-phase traffic signal without extensive channelization is unworkable in view of the six main conflicting streams of traffic. Signallization would require a minimum of a four-phase signal control. If a four-phrase traffic signal was installed at this multiple intersection traffic movement would be paralyzed and would back up worse than under present day conditions.

A study was made as to the possibility of solving the congestion problem by using a surface channelization design. Such a proposed scheme would necessitate the acquisition of 102,500 square feet of property. It would involve the rerouting of several traffic movements in the adjacent areas and, in addition, would require two-phase signal lights. The estimated cost of this scheme totalled $516,730. The surface channelization might solve present day traffic use, but would soon outgrow its usefulness with the increase in motor vehicle traffic induced through this intersection because of surrounding street capacity limitations.

Topographical conditions at this intersection are ideal for underpass construction also preferable for aesthetic reasons. School street has a grade of 3 to 4% sloping away from the intersection to the west and Lusitana Street has a grade of 2½% sloping toward the north. Drainage will be taken care of by way of Emma Street to the south.

Underground utilities always pose a stumbling block to underpass construction.

The total cost of relocating affected utilities is estimated at $100,000. A major portion of the cost is due to relocation of a 20″ high pressure water main along Magellan-Lusitana Streets.

The underpass construction as proposed for the solution of the problem provides a two-branch underpass along School Street and Lusitana Street with a modified traffic circle on the surface (Fig. 2). Three traffic lights are needed at the circle to regulate crossing movements between School-Iolani Streets and Lusitana-Emma Streets.

The total additional land needed for this design amounts to approximately 59,300 square feet. The underpass construction as noted involves an expenditure of $725,000, including the acquisition of land, property damages, relocation of utilities, construction, and engineering. After due consideration of all the possible solutions to solve the congestion at this multiple intersection, the City Planning Commission recommended the construction of an underpass as the most desirable and workable solution to the problem. It will not only take care of present day conditions, but will also accommodate future increases in traffic movements thru the intersection.

Future Traffic Considerations

The existing 28,469 traffic volume entering this intersection daily does not reflect the potential traffic desiring entry. It is believed that a great deal of traffic is avoiding this congested point by detouring to other less direct routes. It is estimated that the total traffic volume will increase to 35,000 cars per 24-hour period within one year after construction of the proposed underpass.

Fig. 2

The Construction of the Model

Realizing that it would be rather difficult to convince the public of the need for a project of this nature by drawings, the Board of Supervisors requested the Commission to construct a scale model (Fig. 2) of the proposed redesign. Field surveys were made to determine the contours and the elevation of the existing streets. The location of the houses and other features were determined from aerial photographs enlarged to the same scale as the model (1/16″ to a foot).

The construction of the model required 1087 man hours of labor and the expenditure of $675 for materials and aerial photographs, for a total cost of $2,849.00.

Financing

Construction of project proposed for the redesign of this intersection depends upon the availability of finances. The Commission recommended to the Board of Supervisors that consideration be given the possibility of using a portion of the Fuel Tax Funds for improvements of this type. (The purpose of the Fuel Tax Funds is to provide adequate street systems for the motoring public who pay this tax).

U. S. Ratifies Convention on International Reciprocity

President Truman has ratified the Convention on Road Traffic, opened for signature at Geneva in September 1949, and a related protocol concerning occupied countries or territories opened for signature at the same time. The convention is designed to facilitate international motoring. It establishes a basis for world-wide uniformity in the reciprocal recognition of motor vehicle registration certificates, drivers' licenses and customs bonds; rules for safe driving: equipment requirements; and maximum sizes and weights on highways designated for international traffic. When the treaty comes into force, a United States motorist will be able to take his car to any foreign country which is a party to the convention and enjoy reciprocity similar to that which he now experiences in his travels in the various states.

A State Highway Traffic and Planning Division

By Kenneth G. McWane (Assoc. Member, ITE)

Traffic and Planning Engineer
Virginia State Highway Department
Richmond, Virginia

THE HIGHWAY Administrator is daily confronted with problems demanding immediate solution. He expects the Traffic and Planning Division to aid him in their solution by recommendations founded on facts, tempered by experience and judgment. The suggested solution must not ignore the hard realities of the situation, such as applicable legislation, availability of funds, and the possible establishment of unworkable precedents. The final answer quite often must, of necessity, be somewhat short of the ideal solution.

The Traffic and Planning Division must, therefore, secure the factual data which is needed to supply the answers to questions of immediacy. Some of these are requests for signals, sidewalks, new bridges, and the like. Others involve route selection, estimated traffic usage, and turning movements on new facilities. Data is also needed for longer range planning. This involves road inventory, priority ratings, estimates of revenue, and research.

Traffic Volumes

Perhaps one of the items of most general interest and usefulness is the information on traffic volumes. Each year a mimeographed tabulation is published showing the annual average 24-hour traffic on each primary state highway throughout its length. Each route is shown by sections which are easily identified. Traffic volumes are shown by the following classes of vehicles:—Virginia passenger cars, foreign passenger cars, light and medium trucks, trailer trucks and buses, and total vehicles. The total vehicle volume as of 1941 is also shown so that a quick comparison can be made with that pre-war peak year. A traffic flow map based on the total vehicle volume is also published.

The Departments' engineers have been able to use this information in many ways. It is used as a guide to determine when to apply reflectorized pavement marking, for system classification, priority of improvement, and accident frequency studies, to mention just a few. The State Police use it as a guide for the placement of their troopers. Private industry also finds it very useful in the selection of locations for filling stations, tourist courts and restaurants.

The basic data is secured by means of manual counts at more than 1000 stations. These are so located as to get a complete coverage on the 9000 miles of primary roads. Eighty of these are key stations. These are counted once every 26 days, providing a total of 14 counts a year made up of 2 Sundays, 2 Mondays etc., for all the days of the week at each station. The key stations are counted from 7 A.M. to 7 P.M., except for every third count, which is for a 24-hour period. These 80 stations are so scheduled that during one month, the stations will be counted on different days of the week. This has proved to be invaluable in calculating the vehicle miles of travel for each month, thus furnishing up-to-date information on traffic trends.

Unclassified recorder counts are taken on the 38,000 miles of secondary roads. Four 2-man parties using 50 accumulative counters and 2 non-accumulative counters each can cover the state in 4 years. Thus counts are available in each county every 4 years. The data from the non-accumulative counters enables a factor of all counts so that comparative vehicle-mile factors can be determined. This is one of the factors used in the distribution of secondary funds, the others being population, area, and road mileage.

Pavement Marking

Pavement marking is applied by the maintenance forces in each of the eight Districts. There was naturally a considerable difference in interpretation of policy. A pavement marking manual, prepared by the Traffic and Planning Division, plus the assignment of an employee to work with the Maintenance Division has done wonders toward uniform marking. This year, the Division will apply reflectorized paint on 4900 miles of the most heavily traveled roads, using non-reflectorized paint on other roads.

Signs and Signals

In 1948, the sign section of the State Manual of Uniform Traffic Control Devices was completed and distributed to the field engineers, who are responsible for sign erection and maintenance. This manual conforms in all important details with the national manual.

Another section dealing with obstruction marking, delineations, and pavement marking suitable for insertion in the manual has just been distributed.

The maintenance budgets provide funds for modernizing all signs on the Class 1 and II roads by July, 1951. It is planned to completely modernize all signs by the following year.

The Highway Commission has jurisdiciton over traffic signals in towns under 3500 population as well as in rural areas. Traffic signals have caused much concern. Usually, requests for signals start when little more than 50% of the minimum warrants are met. It is an understatement to say that it is difficult to convince the proponents that a signal in such a case is not justified. In spite of the fact that the Department has generally held to the warrants recommended by the AASHO, ITE and the National Conference on Street and Highway Safety, the number of signals has

grown from 12 in 1945 to 103 on January 1, 1950.

The most serious problems in highway deficiencies are in the Arlington-Fairfax areas included in the Washington Metropolitan area. The extent of these problems is indicated by the fact that there is a daily interchange between Washington and Arlington County of 166,000 vehicles crossing the Potomac River on four bridges each week day. This exceeds the volume of traffic crossing the Hudson River from New Jersey to New York.

Because of the lack of sufficient funds, it will be many years before all the highways of this area can be constructed to adequate standards. In the meantime, the Department is doing what it can to relieve congestion.

Those who were present at the last ITE Annual Meeting in Washington will recall the paper by Mr. M. M. Todd[1]. This was a very able explanation of a system of signals which had just been put into operation on Route 211 near Washington. This section of Route 211 is 28 feet wide, used as a 3-lane road; is 1½ miles in length and carries from 18,000 to 23,000 vehicles per day. Under these circumstances it is extremely difficult to enter the major road from any one of the many side streets during the peak periods. It was first suggested that about 4 signals strategically located to permit progression be installed to break traffic for the benefit of entering vehicles. Since too much capacity would be lost on this already overloaded road, some means was sought for offsetting this loss. It was found that the traffic during peak periods was unusually one-directional. 80% was inbound in the morning and 72% outbound in the evening.

Mr. Burton Marye, Jr., then Traffic and Planning Engineer, suggested that lane control signals permitting lane shifts be combined with standard intersection coordinated controls. The traffic density variable-cycle type of control was selected as being the most efficient and flexible. Shifting of lane allocation to permit the use of two lanes by the major movement of traffic is done electrically through the interconnection circuits by means of relays in the secondary dispatchers, controlled by a time-clock in the master. The type of progression phase is shifted at the same time by the same clock to fit the lane allocation. This system is working very well indeed.

There are some bright spots in the picture. When the Pentagon Building was built in Arlington County just prior to our entry into the war, an intricate-network of roads was constructed. These roads connect with the two heaviest traveled bridges across the Potomac from Washington, and serve as an excellent distributor to the Virginia area.

Connecting with the Pentagon Network is the Shirley Memorial Highway. This is a freeway by-passing Alexandria and connecting with Route 1 south of Alexandria. It is 17.3 miles long, and saves Route 1 "through" passenger vehicle traffic 3.4 miles in travel distance, and 20 minutes in time. It has not yet been opened to "through" commercial vehicles because a 5-mile section on the south end has not yet been completed as a 4-lane divided highway. This section has only one 24-foot pavement carrying 2-way traffic.

Opened to traffic on September 6, 1949 this highway is presently carrying 4500 vehicles per day on the southern section, and 30,000 vehicles per day on the northern end. When completed, an estimated 1700 commercial vehicles per day are expected to use this highway. The estimated annual savings to through traffic would then be:

617,000 gallons of gasoline
1,365,000 man hours
1,500 tires
7,000,000 miles of travel

Accident Prone Locations

Accident prone locations require prompt investigation and correction. A highway employee has been placed at State Police Headquarters to maintain accident spot maps, and to advise the Department of any location where as many as three accidents occur. Fortunately, although operating as two separate departments, the State Police and the Highway Department work in close cooperation at all levels. This cooperation on the local level enables field engineers to report to the Traffic and Planning Division any hazardous condition which they cannot correct on their own. Complaints are also received from citizens. During the last 6 months, investigations and recommendations for correction were made at 61 such locations.

Wherever possible, the recommended corrections involve appropriate signs, delineators, or pavement markings. There simply is not enough money available to correct all the deficiencies. Sometimes, more drastic measures are required.

Unfortunately, having once learned the conditions along a highway, many operators drive from memory. If conditions are changed, they sometimes fail to adjust their action to the new conditions. Hence, some accidents may be expected to follow any changed condition, no matter how much better than the old.

Traffic Congestion and Parking Problems

Like other American cities, traffic congestion and parking shortage are among the foremost problems facing Virginia communities.

The Urban problem was recognized by the Federal Government when Virginia received an allocation of $1,500,000 for each of five years for the improvement of urban federal-aid routes, these funds to be matched by State and City funds.

Virginia recognized the urban problem when the General Assembly made it possible for the state to finance one-half the cost of urban extensions of the highway systems.

Planning and development of the urban highway extensions are not enough. The cities needed immediate relief from the traffic congestion and parking problems accompanying the upward surge in motor vehicle use following the close of the war.

Again recognizing that rural and urban traffic problems could not be separated by a corporate limit the department established an Urban Section in its Traffic and Planning Division to aid the cities in their solution of traffic and parking problems. The traffic service available to the municipalities is not confined to the urban extensions of the highway system, but extend to all streets and to all forms of motor vehicle transportation. Studies have ranged from traffic control at one intersection to a city-wide survey which included all phases of the traffic and parking problem.

The basic street patterns of Virginia's cities have remained practically unchanged since the original street lines were established. Some streets have been widened but this has provided only temporary relief from traffic congestion. The cities' streets, particularly those in the central business districts were not designed to accommodate the tremendous volumes of daily traffic they are required to serve. Providing

[1] "Reversing Flow in Center Lane of 3-Lane Roads", 1949 Proceedings, Institute of Traffic Engineer.

street widths adequate to handle today's traffic cannot be economically justified in the compact business districts. To relieve the intolerable traffic conditions the cities must resort to an extension of regulatory control.

Complete parking and traffic studies have been made in six cities ranging in population from 10,000 to 50,000. In addition to these complete studies, an origin-destination survey and a parking survey have been made in the City of Richmond, which has a population of approximately 225,000.

Toll Bridges and Ferries

In the eastern part of Virginia, there were in 1940 numerous toll bridges and ferries under private ownership. Realizing that there was little chance that they would ever become free facilities under the existing conditions, the Legislature passed the Revenue Bond Act in that year.

This Act named the State Highway Commission as a bridge authority with power to acquire by purchase or condemnation certain bridges and ferries, and to construct certain other bridges. These are to be made toll-free or nearly so when paid for.

The Traffic and Planning Division in 1940 conducted origin-destination surveys at 27 locations which formed a cordon around the proposed facilities. This data was secured during late spring, mid-summer, and fall, and included weekdays, Saturdays, and Sundays. The data was analyzed and presented in report form, which showed not only the traffic using the present facilities, but also the traffic which could be expected to use the proposed facilities.

The consultant firm of Parsons, Brinckerhoff, Hall and Macdonald was employed in April 1949 to make an estimate of cost and a study of traffic and earnings.

Acting on the recommendations of the consultants, the Bridge Authority issued $19,000,000 in revenue bonds, purchased the James River Bridge System and the Chesapeake Ferries, and now have under construction a bridge across the York River at Yorktown.

These facilities should pay off the bonds in 20 years, after which they will be made toll-free, or nearly so.

Foreign Passenger Car Survey

An interesting foreign passenger car survey was made in Virginia last year. Twenty-five interview stations were located near the State's borders. Interviews were conducted at each station during each of the four seasons. 20,000 interviews were obtained as the vehicles were leaving Virginia.

Some of the more important facts learned from this survey are:

1. 24,100 cars bearing out-of-state license plates enter Virginia daily. Eleven per cent of the owners live in Virginia, but are still using license plates from other states.
2. Of the 24,100 out-of-state cars entering Virginia daily, 49 per cent are on pleasure trips, 44 per cent on business trips, 5 per cent are on combined business and pleasure, and 2 per cent are listed as commuting.
3. Of those out-of-state vehicles registered in states bordering Virginia, 62 per cent were on business, and 32 per cent on pleasure, whereas, of those vehicles from more distant states, 69 per cent were being used for pleasure, and 23 percent for business purposes.
4. The average number of days spent in Virginia was found to be 2.55 days when the trip was pleasure, and 1.88 days when on business.
5. The average spent per person per day was $5.63. Thus, the total amount spent by research visitors to Virginia, traveling by car alone, amounts to over $220,000,000.

Research

In the line of research, two projects are being planned in cooperation with the Bureau of Public Roads. These are in connection with the aforementioned Shirley Memorial Highway. One of these projects has for its purpose a determination of actual usage of an expressway versus the predicted usage on the basis of methods now used. The other project is a study of the effect of an expressway on land values.

Underway at the present time is a research project in Charlotte County, known as the Charlotte County Research Project. The purpose of this study is:

1. To determine the impact of a new industry on the population of a rural, agricultural area.
2. To investigate the relation of road service to the social and economic needs of the area, and to determine the systems of roads which will best provide for those needs.
3. To determine the kinds of roads the people want, and are willing to pay for.
4. To determine the most economical method of providing all weather year round surfaces on roads carrying low traffic volumes.

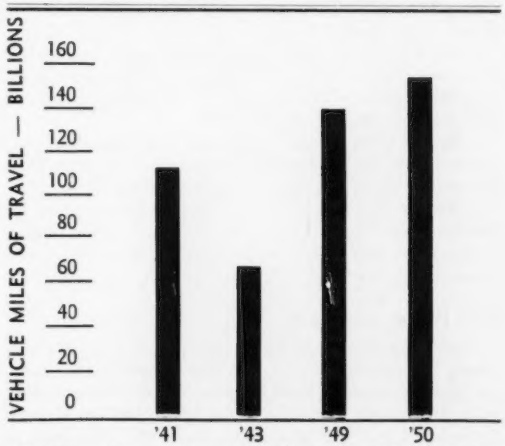
This is a joint study undertaken by the Bureau of Public Roads, the University of Virginia, Virginia Military Institute, the Virginia Department of Highways, and the Virginia Council for Highway Investigation and Research.

A "before" study was made prior to the beginning of operations at a new industry then under construction. This data is now being analyzed by the University of Virginia.

Following a few years of operation, an "after" study will be made.

The Virginia Council for Highway Investigation and Research and Virginia Military Institute are working on the low cost road phase. It is hoped that this project will provide the answers to many perplexing problems of the highway administrator.

Traffic Trends



TRAVEL ON RURAL ROADS FOR FIRST EIGHT MONTHS of 1941, 1943, 1949 and 1950.

Based on Bureau of Public Roads Data

Against The Adoption of Polarized Headlights At This Time

By Engineering Liaison Committee
of the Automobile Manufacturers Association

The April and July issues of "Traffic Engineering" magazine contain articles written by E. H. Land and L. W. Chubb Jr., entitled "Polarized Light for Auto Headlights." The second article makes reference to the tests of polarized headlights conducted by the Automobile Manufacturers Association at the request of the American Association of Motor Vehicle Administration. To further acquaint our readers with the pros and cons of polarized headlighting, "Traffic Engineering" herewith publishes the second article covering the report of the Engineering Liaison Committee of the AMA on the subject. We are indebted to Mr. W. F. Sherman, Manager of the Engineering and Technical Department of the AMA, for supplying a copy of this report, which was presented before the 15th Annual Convention of the AAMVA on November 10, 1947.

Part II

The New System in Use

DRIVERS OF cars using the polarized headlamps and viewers have the same ability to detect pedestrians in dark clothing as they would have with Sealed Beam uppers, and this ability to see is maintained when the cars meet, even when the opposing lamps are between the driver and the roadway illuminated by his headlamps. Road vision during the operation of meeting an opposing car is much better than obtainable with Sealed Beam.

When using the polarized lamps without a viewer on the open road the driver has a more satisfactory beam than Sealed Beam upper.

An abrupt switch from Sealed Beam upper to polarized light with viewer shows a change in appearance. Some observers believe that the reduction in distant vision of light colored objects is objectionable.

Aim of the polarized lamps does not affect the glare protection of the viewer on a meeting car. Proper aim is however required for good road illumination.

The city lamps without the viewer provide an attractive result, but with the viewer in use do not give as good seeing of an object over 100 ft. ahead of the car as does Sealed Beam lower.

New Driving Conditions

The viewer not only stops direct beams from opposing lamps, but also light reflected without depolarization from the roadway or atmospheric particles. Therefore atmospheric glow from lamps about a curve, or over a hill top becomes invisible to a driver behind a viewer. It becomes more necessary then ever before to ensure that drivers at night stay on their own side of the road when approaching curves and hill tops.

Drivers must go onto the left side of the road to overtake and pass a car going in the same direction. This operation is frequently carried out immediately after passing one meeting car and must be completed without encroaching on the road required by a second meeting car. The headlamps of the second car are completely concealed for a time if it passes through a small road depression causing the lamps to drop below the would-be passer's line of sight. Under such conditions a following car might suddenly emerge into the passing driver's path too close for safety. The possibility of trouble is aggravated by a second possibility. Even on a level road the first meeting car can at times mask the lamps on the second car, which can be detected only by direct sight of the second car's lamps. Today the road illumination from the second car's lamps provides warning. With polarized lights, a one eyed car with only a right hand lamp following another could cause more complications than today.

A driver using a viewer finds the general appearance of polarized lamps when meeting very different from the present appearance of Sealed Beam lowers. The lamps are much fainter, and practically all evidence of road and roadside illumination in front of the car has disappeared. Most drivers agree that the apparent distance to the meeting car seems different than with Sealed Beam lower beams, but there are quite different opinions as to the overall effect upon a driver's judgment when deciding to overtake and pass. Some presons very sensitive to glare believe overtaking conditions in traffic with polarized lamps are better than with Sealed Beam lamps. Others believe decision as to when it is safe to pass is more difficult than with Sealed Beam. It may not be possible to resolve these differences of opinion entirely. Very extensive tests would undoubtedly be required to develop the facts needed to explain or if possible compose these differences of opinion.

Glare Conditions with Polarized Light and Sealed Beam in Use

Sealed Beam upper beams are normally aimed somewhat below the horizontal for the empty car. This aim is retained when front seat passengers are the only load, therefore opposing drivers do not always face the maximum candlepower. Polarized lights are aimed horizontally with the empty car. Depending on Sealed Beam aim, observers without viewers receive from 50% to 200% more light from the polarized light than from Sealed Beam uppers.

Mr. Roper and the General Electric Co. have conducted extensive tests to obtain data on the effects on seeing of glare from both Sealed Beam and polarized lamps. Under conditions of his tests, glare from polarized lights caused only a small decrease in seeing distance as compared to glare from Sealed Beam uppers. This seeing distance is too short for safety with either type of lighting at speeds fre-

quently used in the midwestern states. In interpreting this data, it must not be forgotten that it was obtained by skilled drivers of normal visual acuity looking through clean windshields, who expected the test dummy to loom up into view. They knew that the road was straight, and that the oncoming glare car would be properly driven. These test results may not seem convincing to an ordinary driver without a viewer called upon to meet a glaring polarized light car under difficult road and weather conditions. Those who have driven the polarized cars on the road report that meeting drivers signal for depressing at greater distances than when Sealed Beam is used. Failure to depress at greater distances than with Sealed Beam will result in more complaint about glare than at present.

A Sealed Beam driver with a viewer can stop the light from a polarized light car while the driver of the latter receives serious glare from the Sealed Beam lamps. The driver using polarized lights can obtain no effective protection.

Pedestrians on country roads and owners of houses on the outside of curves close to the road will receive more light from polarized lamps than at present.

The Committee at present finds it very difficult to estimate the importance of some of these conditions. It is informed that the overall effect of the introduction of Sealed Beam was a marked improvement in headlighting conditions. It also receives repeated reports that lack of proper use of the depressing switch is causing real complaint about glare conditions in certain areas. The Committee therefore fears a serious public reaction against polarized lighting after introduction, if many of its users failed to depress for the benefit of meeting Sealed Beam cars.

New Legislation Required

To permit the use of the polarized headlamps the present 75,000 maximum candlepower limit, and the 8000 cp. limit 1° up must be removed. The requirement for depressing when cars meet must be removed for meetings in which all cars are equipped with polarized light.

Polarized lights must be depressed when meeting cars with ordinary lights. Under such conditions such depression must be made at greater distances than the present 500 ft. requirement of the Uniform Vehicle Code, which actually is not practiced in most Sealed Beam meetings. A distance requirement is really not enforceable. A new legal requirement for depressing could probably be developed which would meet the needs of both types of lighting. Mr. Roper's data on seeing when meeting should be studied.

Present day lighting will continue in progressively diminishing use until present cars are worn out. Therefore the new legislation permitting polarized must continue present controls of ordinary lighting.

Legislation permitting the use of the polarized lighting must be maintained in force in all states, otherwise the use of a part of the polarized equipment registered in other states must be abandoned. Repeal in any state would be likely to result in abandoning the use of polarized light by all manufacturers on all production.

Educational Problems

Users of polarized equipment must be educated to use it in such a way as to avoid arousing resentment from those who might feel that drivers of polarized equipment have an unfair advantage, and in such a way as to avoid creating any new hazards. Many of the bad practices against which this education is to be directed also exists with Sealed Beam equipment. Elimination of these bad practices seems more necessary for polarized lighting.

Drivers using polarized lights would have to learn to depress promptly when signalled, and preferably before being signalled. This must be done even when there is an approaching polarized light car between a driver and the signalling driver of Sealed Beam equipment.

Polarized light drivers would have to learn to stay on their own side of the road when approaching curves and hill tops at night, and also to avoid going to the left side of the road in overtaking unless certain that the road permits no opportunity for surprise. Also driving when the left headlamp is burned out is more likely to cause trouble than with ordinary light.

They must learn that the polarized lights will cause more annoyance to a driver being followed than will Sealed Beam.

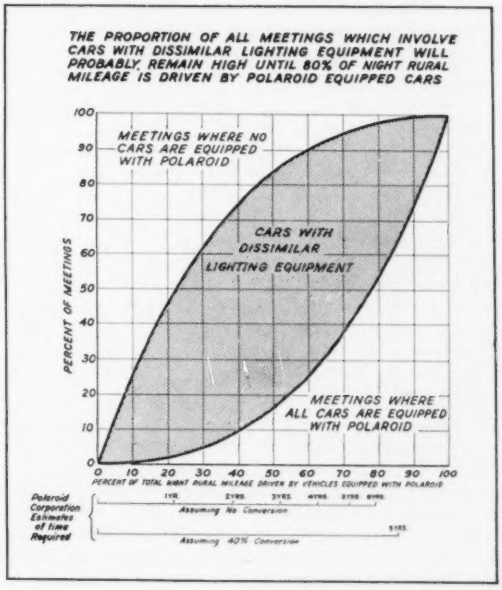
They must be taught to be very careful of the aim of the city lamps, and particularly of the possible effects of excessive loading of the trunk compartment.

Drivers of ordinary lighting would need instruction regarding the characteristics of the polarized lamps, and that polarized light drivers can be dangerously glared by Sealed Beam upper beams.

The Committee realizes fully that up to the present no successful method of educating the public on the proper use of headlamp equipment has been found. Such education would become much more necessary if polarized lighting is introduced, since a large part of the public may assume that polarization necessarily eliminates glare for everyone, and develop serious resentment if glare continues, particularly if some conditions seem worse than before.

Conditions after Introduction of Polarized Lighting

The benefits of polarized light in improved seeing conditions when meeting at night exist only when all cars involved in the meeting are polarized. If any car present at a meeting carries Sealed Beam, all headlamp beams must be depressed. The reduced hazards when meeting, during


THE PROPORTION OF ALL MEETINGS WHICH INVOLVE CARS WITH DISSIMILAR LIGHTING EQUIPMENT WILL PROBABLY REMAIN HIGH UNTIL 80% OF NIGHT RURAL MILEAGE IS DRIVEN BY POLAROID EQUIPPED CARS
MEETINGS WHERE NO CARS ARE EQUIPPED WITH POLAROID
CARS WITH DISSIMILAR LIGHTING EQUIPMENT
MEETINGS WHERE ALL CARS ARE EQUIPPED WITH POLAROID
PERCENT OF MEETINGS
0 10 20 30 40 50 60 70 80 90 100
PERCENT OF TOTAL NIGHT RURAL MILEAGE DRIVEN BY VEHICLES EQUIPPED WITH POLAROID
Polaroid Corporation Estimates of time Required
1YR. 2YRS. 3YRS. 4YRS. 5YRS. 6YRS.
Assuming No Conversion
5YRS.
Assuming 40% Conversion

simultaneous public use of both types of equipment, will increase in percentage only as the percentage of meetings increases where the polarized lights can be used. As stated above, polarized lighting is not likely to be introduced at a greater rate than the percentage of cars produced after the introductory date. This means that after one year only 10% to 12% of all cars will carry polarized lights.

The percentage of meetings where polarized lights can be used increases more slowly than the percentage of miles driven with polarized lights during the early introductory period. Mr. A. T. Court has made an analysis of this condition. When the percentage of the mileage driven with polarized lights reaches 50% of the total mileage, only 25% of the meetings involving only two cars will be between two polarized light cars, and 50% of all the meetings will involve meetings between mixed equipment, and 25% will be between cars carrying only Sealed Beam lights. The accompanying figure is Mr. Court's curve sheet which shows the overall effect of increasing the percentage of use of polarized lights, taking account of all meetings, whether involving only two cars or more than two cars. Traffic conditions recorded on a certain trunk road on a certain night were used in developing these curves. For these conditions 77% of all mileage must be with polarized lights before half the meetings will permit the free use of polarized lighting. This curve sheet is correct only for the assumed traffic conditions. In the open country, on side roads, conditions would be more favorable for polarized lighting. Conditions would be less favorable on main roads entering large cities. A greater percentage of new cars is however always found in city and suburban areas.

Safety and freedom from annoyance during meetings with mixed equipment, when all headlamps depress properly should be about the same as with Sealed Beam. Under some conditions of bad practice, at least greater annoyance than at present is certain. In any event, reduction in the accidents in any way due to glare must come slowly during the initial period of introduction. If mixed meetings result in any appreciable increase in annoyance or in accidents, these effects will be more conspicuous than the initial gains.

Compulsory vs. Optional Introduction of Polarized Headlighting

The only method of introducing polarized headlighting which has seemed to be possible is Method I, in which it is assumed that all new cars after a certain date carry the new system because of legal requirement. Most of the administrators consulted by the Committee are of the opinion that legislation compelling the use of polarized headlighting on any cars, new or old, is probably impossible. They feel that legislation permitting polarized headlighting is about all that can be expected. To expect a manufacturer to install polarized headlighting on all production with no more protection than permissive legislation is to expect that manufacturer to apply the compulsion to the car buyer which that car buyer, in the opinion of his legislators, is not yet ready to accept.

Recommendation

The automobile industry, with the cooperation of the Polaroid Corporation and the General Electric Company, has developed a complete polarized headlighting system in order to investigate its possibilities as an answer to the glare problem. The system has been subjected to extensive testing and study not only by the industry's lighting engineers but also by the same engineering executives who were responsible for the development of the Sealed Beam headlamps.

On the basis of this development work, the Engineering Liaison Committee of the Automobile Manufacturers Association, which has been responsible for the investigation, has recommended against the adoption of polarized headlighting at this time. This recommendation has been approved by the Board of Direction of the Association and is concurred in by the Ford Motor Company, which has cooperated in the program. The recommendation is based on the following considerations, among others:

1. The full benefits of such improved seeing and relief from glare as may be afforded by polarized headlighting when driving on rural roads would be obtained only when used on all cars.

2. Such universal rural use cannot be secured quickly since there appears to be no practical way to quickly convert the more than thirty million cars on the highways to polarized headlighting.

3. Introduction of polarized headlighting on new cars only would be followed by a lengthy period of mixed use of new and present headlighting.

4. During this period of mixed use, among the probabilities foreseen are the following:

   A. Drivers who have paid the higher prices for new cars made necessary by polarized lighting would be disappointed at the long delay in getting the advantages of the new lighting in any large percentage of meetings with other cars at night.

   B. Careless or discourteous drivers of cars with present lighting could use their upper beams to glare the drivers of polarized lighting, and at the same time protect themselves against the glare of the polarized beam simply by equipping their cars with polarized viewers.

   C. The percentage of drivers of polarized lights who would be careless or discourteous in the use of the polarized beam when meeting cars with present lighting may be expected to be as large as it is with drivers of Sealed Beam cars, and just as hard to control through police power as at present.

   D. Thus glare would continue to be a problem, and particularly during the first part of a period of mixed driving might well produce a build-up of public resentment against polarized lights that would result in the repeal of permissive legislation in some states. This would interfere seriously with interstate motoring and incidentally produce serious problems in the distribution of mass produced automobiles.

5. New hazards will develop in the use of polarized headlighting at hill tops, curves, and when overtaking and passing unless all drivers follow different practices than those used by some drivers today. It has been difficult in the past to persuade many drivers to change their habits by educational methods.

Based on experience to date, the Committee is not convinced that the benefits during a considerable period after complete conversion to polarized lighting will overbalance the troubles which it feels certain will develop in the long transition period. Therefore, the Committee believes that it is not in the public interest to introduce polarized lighting at the present time.

The Committee would be very glad to study, in cooperation with the administrators if they so desire, any new developments which may promise to make the introduction of polarized headlighting, at some later date, a worth while venture in the interest of public safety.

The Role of the Motor Truck in Highway Traffic

By Wade Sherrard

General Manager, California Motor Transport Association, Inc.
Los Angeles, California

This paper was presented at the Annual Meeting of the Western Section, ITE, August 3-4, 1950, in Los Angeles, California. The paper envoked such a lively discussion at the meeting that a special request was made to the Editor that it be reproduced, at least in part, in "Traffic Engineering."

I WOULD LIKE to preface my remarks with a brief description of the organized trucking industry.

In each Western State, there is an Association that represents all classes of carriers. In California, because of the size of the State and the number of carriers, there are four Associations that are banded together into one, for the purpose of handling matters statewide in their nature or effect. It is this one, the California Motor Transport Associations, Inc., that I represent here today.

Also in California we have a Chapter of the National Highway Users Conference, and the Joint Highway Transport Conference; the latter a group of 20 prominent, representative carriers who are organized for the purpose of studying and recommending solutions to the mutual problems that confront all classes of carriers.

There is also the Western Highway Institute,[1] which concerns itself with problems peculiar to, and more or less common among all Western States. These include highway engineering and research. The Transportation Association of America is another of the numerous and various groups.

Each of the State Associations, primarily representative of what is referred to commonly as the for-hire carriers, but whose membership also includes proprietary carriers, is affiliated with a national organization known as the American Trucking Association, Inc. This body is responsible for the industry's affairs on the national level.

The Effect of the Truck on our Daily Economy

The subject assigned to me, "The Role of the Motor Truck in Highway Traffic", is so comprehensive that I hardly know where to begin.

The treatment of the truck traffic problem requires the most astute judgment and knowledge of its importance. Let us review the importance of the truck. Glance around you, and I believe that you will be surprised to note that every single thing in the room had to be brought here by truck. It wasn't even possible for the hotel or the contractor to have a choice. In certain areas, and with many commodities trucks are a monopoly in the transportation business. Monopolies create exceptional responsibilities.

Not long ago, the California Motor Transport Associations, Inc. made a survey of cities and towns in California to determnie the extent of truck service, as compared to other forms of transportation. There are slightly more than 3,000 separate business communities in this State. More than 1,000 of these had no form of freight transportation service except truck. A similar situation applies to other Western States where the growth of the entire region has been tied closely to the development of highways, and the highways to the engineering improvement of trucks.

Another area in which the impact of the truck is enormous is that of employment where, in the United States, one out of eleven employed persons is directly connected with the production and use of commercial motor vehicles. Next to agriculture, it is said to be the largest employer in the United States.

The usefulness of the truck is demonstrated by the tremendous growth in registration figures. Today, there are approximately 7,500,000 trucks registered in the United States. Over 600,000 of them are registered in California. Three million trucks serve the farms of the Nation; the remainder is divided between private industry, government agencies, railroad-owned, and about a million are operated by the so-called "for-hire" industry.

The importance of the truck to our way of living in the West can best be demonstrated by telling you that in the major produce markets more than 90 per cent of the apples, beans, cabbages, corn, cucumbers, milk, strawberries, tomatoes, and livestock move exclusively by truck. If trucks were to suddenly stop operating, the life of the nation would be imperiled! Our economy and way of life are geared to trucks!!!

Despite the fact that the truck is a relatively small per cent of the total number of vehicles on the road, it is a very large tax contributor.

I wish to emphasize this, because it is too often overlooked in a discussion of the role of the truck. According to the Council of State Governments, the average single unit truck in California with 12,500 lbs. gross vehicle weight, in a for-hire operation, contributes $386.50 annually toward highway costs. A truck with 18,500 lbs. gross weight capacity contributes $612.07; and a tractor semi-trailer with 64,000 lbs. gross vehicle weight contributes $2,982 per year toward our highway costs. Compare this to the average annual taxes paid on a two-door sedan in California, which amounts to $47.92 annually.

Note that it takes more than 60 medium weight, two-

[1] Ed. Note: Edwin L. Mills (Mem., I.T.E.) is Highway Traffic Engineer for the Institute.

door automobiles to contribute the monies paid by the owner of one tractor semi-trailer. It is important that those regulating truck traffic keep in mind the tremendous financial contributions of the truck segment of the highway user group.

The subject of national defense might place a heavier responsibility on trucks than has ever been true in the past. The threat of enemy invasion, or the bombing of points within the United States, is a very real possibility! The Western States are dependent for rail service on a very slender network of rail lines. A very few bombs, strategically dropped, would throw the entire transportation responsibility upon the highway carrier. There is no doubt that the trucking industry is capable of meeting almost any transportation situation; but it can only do so if laws and regulations are reasonable, and if you gentlemen have an understanding treatment of the truck problems.

Responsibilities of the Trucking Industry

The trucking industry is generally aware of its responsibilities to the people, and of its faults. We long ago recognized the hostility caused by excessive muffler noise. The California Motor Transport Associations, Inc., has spent much time and energy, and large sums of money in its efforts to solve this seemingly simple problem. We have conducted two comprehensive series of tests of every muffler available in the country, and we are now prepared to conduct a third series of tests. The subject of noise and its suppression is highly technical. Our efforts so far, however, have already made it possible for operators to select quieter and more efficient mufflers than had been possible in the past.

Not long ago, much was said about the evils of diesel smoke, and a self-policing program was set up with all offending operators being required to appear before a group of diesel specialists in our own industry. After one year, this program was discontinued, for the reason that the inspectors of the Los Angeles Air Pollution Control Board informed us that violations were so infrequent that our self-policing program could be suspended.

After all, the truck is a medium of commerce. There is nothing aesthetic about its use, nor was there about the steam locomotives when they superseded the barge canals the poets love to picture in verse.

We are alarmed over the publicity regarding alleged violation of State size and weight laws by the trucking industry. The position of the California Motor Transport Association, Inc.; and, in fact, all trucking Associations on law violation, is stated in the following resolution adopted unanimously and we endorse:

"The American Trucking Associations vigorously and unqualifiedly condemns the practice of violations of State Truck Weight Laws by anyone, and pledges to all regulatory officials its active cooperation, and that of its affiliated Associations, in all efforts toward elimination of this abuse where it exists."

Any discussion of the question of overloaded trucks must be preceded by a careful distinction between trucks that are overloaded in relation to a recommended national standard, and those that are overloaded in relation to an existing State law. The organized trucking industry has no patience whatsoever with law enforcement officials or the judiciary; or, of course, the legislature, where penalties for overweight violations are so meager and ineffective that carriers can transport overloads profitably.

Please note that the trucking industry is made up of literally hundreds of thousands of truck owners who constitute a cross-section of the American people. Among them are for-hire carriers, farmers, and every type of business concern imaginable.

Any large and representative group is bound to have some individuals who violate laws. Laws of every type, ranging from double-parking to murder are violated every day by people from all walks of life.

Truck Safety Programs

We are vitally interested in the performance and conduct of all truck drivers in California. I am sure that this same statement applies to other trucking Associations throughout the country. After all, they are the trucking industry's representatives seen by the public on the highways. It is for this reason that the industry's policies with respect to employment standards and training have become more and more strict during the past few years. This program has the full support of all Teamsters labor organizations; and, as a by-product, has resulted in major reductions in our accident frequency.

A typical trucking Association approaches the subject of driver-safety with realism. There is not only the normal desire to avoid human injury and death, but there is also in our industry the economic problem. It is a matter of economic necessity that trucks operate safely, and with the least inconvenience to other traffic on the highways. Before drivers are employed, their past records are carefully checked by the prospective employer. If the past record is in order, the driver is sent through a driver-testing Center, jointly sponsored by the owners and the Unions for a rigid medical examination, as well as tests of drivers' knowledge of traffic rules. The driver is also required to take the tests provided by a battery of psycho-physical testing equipment.

The Driver Safety Center in Los Angeles has been in operation for almost four years, and averages about 450 drivers per month. These tests are not only valuable to the driver as well as the employer for the information they contain, but they are also valuable from the standpoint of letting the driver know that his health and qualifications are important.

In addition to these tests, the industry sponsors several major contests which have for their purpose the continuous reminder to the drivers and to the employers that safety must be practiced at all times! Our one-sentence definition for safety is, "The driver must have safety-consciousness." Truly, the truck driver is "The Gentleman of the Highway", and we are proud of him!

Trucking in Urban Areas

In my opinion, Traffic Engineers should be alert to the necessity for constructing streets and highways to adequately accommodate trucks. Consideration should be given to the necessity for loading zones for trucks which will meet the requirements of merchants, and which will not unduly burden other traffic.

Consideration is given at frequent intervals toward requiring all loading and unloading to be conducted during certain specified hours. I believe I can truthfully say that the trucking industry might support any reasonable plan if it were designed for particular local conditions. But, here, we find shippers and receivers who are to be considered, and our exploration of this problem indicates that great resistence would be felt if, by local ordinance, trucks were to be loaded and unloaded in prescribed areas at night, or during periods other than the conventional working hours of the shipper or consignee.

I am doubtful that cities should ever be permitted to prohibit truck traffic from any street without the express written approval of a State authority. Such State authority should not be permitted to give such approval unless it has conducted a public hearing, and received convincing evidence that the street is not adequate to accommodate trucks, or that public safety requires some restriction against trucks.

In my personal experience with the subject of truck routes, I find local politicians unable to resist the loud and persistent demands of small groups of constituents. There seems to be no way to avoid this; therefore, the final responsibility should be placed in the hands of non-political experts such as you, gentlemen.

From our point of view, if the cities receive large sums of money from truck taxes, they should not be permitted to discriminate against them.

The argument with respect to the size of equipment to be permitted in downtown or congested areas goes merrily on. There are those who say that no vehicle other than the conventional straight pickup truck should be permitted in downtown areas. I haven't any particular ideas on the subject, but you are cautioned to note that a small tractor semi can transport more than twice the amount of freight carried by a straight truck. The maneuverability of a tractor-semi is near that of a straight truck; and, in respect to reduction of traffic congestion, we might well ponder the difference between 100 straight trucks and 50 small tractor-semis.

Those responsible for traffic engineering in the respective communities can expect the cooperation of trucking Association officials. It is our professional business to attempt to get along with people, and particularly with those responsible for laws and the enforcement of our laws. I can say without fear of contradiction that every Association stands for rigid law enforcement. If we are dissatisfied with the law, we seek to have it changed; but, in the meantime, you can expect us to assist you in any traffic problem.

Note also that if consideration is being given to some situation that will affect the trucking industry, you can expect much better compliance and more satisfactory cooperation if you will alert the trucking Association Manager to your plans, and call him in for consultation before taking final action. All trucking companies contribute toward these Associations, and are inclined to view the Association Manager as a friend and advisor.

We are grateful to the officials of the Western Section of the Institute of Traffic Engineers for the opportunity of presenting the truckman's side of our problem. I do not recall that we have previously been invited to appear before this important group. As a representative of the second largest highway user group, I can say that we appreciate this opportunity of meeting with you and discussing these problems.

It is our desire to cooperate with you in every possible way. There is every reason why we should work together. I trust that what I have said will assist in building a feeling of mutual confidence and respect which, in turn, will hurry the time when some of these vexing problems will have been solved. To maintain the tremendous growth and development in the West, we must treat the truck traffic problem with the best judgment at our command.

Zoning for Parking Facilities

At least 185 localities in 29 states and the District of Columbia now have an ordinance requiring the provision of off-street parking facilities in connection with various property uses.

It is sheer extravagance to create a new use or build a new structure without making adequate provision for the parking space that will be needed inevitably in connection with it.

Of the midwestern states in which cities have made use of the zoning ordinance for establishing parking facilities are Minnesota, North and South Dakota, Oklahoma, Arkansas, Louisiana, and Mississippi.

In 34 of the 64 places where parking facilities are required in commercial districts the provisions are effective in the central business district.

There is a legitimate place for use of the zoning mechanism in downtown areas especially where it will promote the establishment of cooperative or group parking facilities.

A word about the legal characteristics; local governments generally are given the authority to enact local laws that promote the public health, safety, morals, and general welfare of the citizens. Pursuant to such legal sanctions, an increasing number of municipalities have undertaken to require the provision of a prescribed amount of off-street parking facilities when structures are erected or altered substantially.

The Bulletin recites the space requirements for various uses. In some cases these specific requirements are arbitrarily set and in other cities they are determined for each use in each locality by the Board of Zoning.

These space requirements cover multiple family dwellings, hotels, tourist homes, hospitals, clinic buildings, mortuaries, welfare institutions, libraries, dance halls, bowling alleys, theaters, stadiums, churches, office buildings, restaurants, night clubs, department stores, manufacturing establishments, and so forth.

It is elementary that accessibility constitutes one of the principal characteristics of value. The provision of parking facilities restores, stabilizes, or enhances accessibility.

Most objective observers will agree that the lack of adequate off-street parking facilities creates congestion, obstructs the free circulation of traffic, diminishes property values, and frequently endangers the health, safety, and general welfare of the community. Parking facilities appropriately located and attractive in user cost, constitute one of the great public needs. It should not be difficult to qualify the provisions of such facilities through the zoning mechanism as a constitutional exercise of the police power.

Extracts from
Bulletin No. 24 of the Highway Research Board
Prepared by
The City Planning Board of St. Paul, Minn.

Reference Notes

By John J. Benneth
Assistant Director Traffic and Transportation Comm., Portland, Oregon

Death Valley Disappears

THE CITY OF Portland, Oregon, recently put into operation a new type of traffic signal installation, believed to be the first of its kind, which is designed to aid blind people in crossing a busy high-speed arterial highway.

The apparatus consists of a system of buzzers which operate in conjunction with a regular traffic installation at the intersection of N.E. 82nd avenue and Glisan street in Portland. The signals at this corner are part of a progressive signal system on 82nd avenue, and the buzzers do not control the operation of the lights. Pedestrian walk-wait signals are installed at the corner, and when the blind pedestrian presses a button on the box provided at each crossing, the buzzer will sound if the "walk" signal is on. If it is the "wait" signal which is on, he must continue to press the button until the "walk" signal comes on again before the buzzer will sound. Thus, the blind person is informed when the "walk" signal is showing in his lane.

The regular installation consists of two vehicular signals suspended above each entrance to the intersection. The walk-wait signals are mounted over each pedestrian lane, and are so timed that the "wait" signal comes on before the amber vehicular light, giving pedestrians time to clear the intersection before the lights change.

Altogether, there are eight buzzers in the system, one for each direction at each of the four pedestrian lanes. The boxes measure approximately 4 x 6 inches, and each one is individually actuated by a button one-and-a-half inches in diameter—large enough for a blind person to find easily.

People who are both blind and deaf may also use the new facility, since the buzzer creates a distinct vibration which can be felt by touching the button. The city plans eventually to install this type of pedestrian signal system at other intersections where blind pedestrians may concentrate.

The equipment was designed by Traffic Engineer Fred T. Fowler and his staff, and plans for the system were drawn by Briggs Clark, traffic signal engineer for Portland. The special facilities were needed at this intersection because a trade school for the blind is located a block and a half from the spot, and many blind students must regularly cross 82nd avenue at Glisan.

Blind people at the school had named the intersection "death valley" before the buzzers were installed. Since that time, the Oregon Federation of The Blind has presented a certificate of commendation to Fred Fowler in appreciation of his successful effort to eliminate the dangerous hazard at this intersection.

Pictured above are blind pedestrians trying out a new traffic installation which was recently put into operation for them in Portland, Oregon. Honorable Dorothy McCullough Lee, extreme left, Mayor of Portland, is an interested spectator.

Here is the improved Permanent Station Traficounter — the latest in the line of Traficounters Streeter-Amet has developed over a period of many years. All highway departments who have relied on Streeter-Amet for help in their traffic problems will appreciate the many advantages of this new Traficounter. The detection is not affected by any weather — snow or ice. It is designed especially to eliminate rubber tubes or treadles. It detects vehicles at high or low density of traffic.

NEW PERMANENT STATION TRAFICOUNTER

Below: Counter Open

Write for information regarding this permanent Station Traficounter

Streeter-Amet Company
1726 BELLE PLAINE AVENUE
CHICAGO 13, ILLINOIS

By Charles A. Pemberton (Assoc. Mem., ITE)
Economics and Statistics
Arizona Highway Department,
Phoenix, Arizona

Theory of Assigning Traffic to a Given Facility

The author has attempted to enlarge upon a theory suggested by Mr. M. Earl Campbell of the Highway Research Board and presented to readers in "Open Discussion" columns of TRAFFIC ENGINEERING on page 88, November, 1949 issue. Since that time, Mr. Campbell has received correspondence from 23 state highway departments. A compendium of the replies has been prepared by Mr. Campbell and is available upon request.

ORIGIN AND destination surveys have provided trip data, which, if properly used, would furnish an accurate basis for trip assignment to any given route or facility, regardless of whether or not the route existed at the time of study. Various methods of utilizing the Origin and Destination data have been tried, but up to the present the most used was that which was based on the time distance.

Traffic assignment studies which were conducted by the Division of Economics and Statistics of the Arizona Highway Department included two proposed freeways, two one-way streets and approximately 50 miles of streets in the Phoenix metropolitan arterial system. The methods used for assigning potential traffic to these facilities were based on a distance-time ratio of 2:1; i.e. 20 m.p.h. on existing streets and 40 m.p.h. on the expressway.

Intangibles

The questionable and unsatisfactory aspects of assigning divertable traffic by past methods have been the failure to affix a value for intangible factors. It is believed that time and/or distance alone are not a sufficiently reliable basis for the facts as they exist. A factor for economy and time can be computed with reasonable accuracy, but beyond these considerations there are yet further weights that must be considered.

Studies conducted in the past which dealt with traffic volumes predicted before construction of a new facility compared to volumes actually counted after completion of the project, have indicated a plus percentage of from 15 to 25 percent* for induced or generated traffic which was attracted to the superior route in spite of greater distance, higher operating cost etc., over that which was assigned from strictly distance ratios. This would seem to indicate that a possible flat 20 percent increase would be permissible, in order that this traffic would be acounted for. It is believed, however, that in view of other intangibles that 25 or even 30 percent would not be unreasonable.

Divertable Traffic

For the freeway study in the Phoenix area, a conversion curve was developed for the ratios of the difference in distance and/or time on the freeway, as compared with existing facilities. A method of determining the value of the various ratios in percentage of possible diversion was thus established. The degree of accuracy obtained was dependent upon the judgment of engineers in the Department and no method for proving the theory has been forthcoming.

In view of the indefinite nature of the theories advanced to the present regarding traffic assignment, it is believed that further study should be directed toward the theory advanced by Mr. M. Earl Campbell, Engineer of Traffic and Operations, Highway Research Board, as presented in the November, 1949 issue of "Traffic Engineering". Mr. Campbell's thesis directs thought toward a solution on the basis of the relationship betwen time, distance and economy.

According to this thesis after distance-time ratios are determined, a separate curve would be required for each ratio group. The location of equal economy is determined by the value obtained from cost per mile of travel on existing streets divided by the cost per mile of travel by the expressway. It is assumed that from the point of equal distance, the expressway would demand the maximum percentage of diversion. As the *distance* increases on the expressway compared to the travel distance on existing streets, the advantage of the expressway decreases to zero, at which point the travel *time* becomes equal.

Conversely, at a point where travel time is equal, the choice of routes would naturally be that of the city streets and as the travel time element decreased, an increase in expressway usage would result. It is assumed that 50 percent diversion would occur at the point where equal economy is reached. From this point of equal economy, combined with a decrease in distance and an increased saving in time, a sharp increase in attraction to the expressway would develop.

In other words, it is logical to assume that nearly 100 percent diversion could be realized when travel *distance* was equal or less on the expressway and appproximately zero diversion when the travel *time* was equal or greater. Only economy of use is weighed in this opinion. Additional values which must be considered are comfort, safety and the aesthetic factor.

The Diversion Curve

Assuming that the foregoing theory is correct, there is yet the problem of determining the intermediate points on the curve which fall between 100 percent, 50 percent and 0 percent diversion. With these known points, and beginning with 0 diversion (equal time), the locus of the curve increases in percentage diversion to a point where equal economy is reached, at which point it is believed that the rate of increase should be maintained at a rate similar to Curve "A". (See the figure on the next page). In other words, as the economy, distance and time factors become more favorable beyond equal economy, the rate of increase

*The author did not mention the source of these figures. (ED.)

in use would progressively increase to an ordinate approximately opposite 95 percent, from which point the curve would flatten until 100 percent was reached. Curve "B" reflects the unadjusted curve in Mr. Campbell's study.

Application of a 20 percent increase for intangibles is shown by Curve "C" and 30 percent is represented by Curve "D". It will be noted that with these additional factors applied to divertable traffic, the indicated adjusted curve falls below 100 percent. The reasoning for this is influenced by the belief that under normal conditions, considering the whims of human nature, it would be impossible to divert 100 percent of the traffic to any facility, when a choice between routes existed.

Speeds

It is believed that an *average* assumed operating speed of 40 m.p.h. on the expressway would not be incorrect for traffic assignment purposes. The design speed should be higher than the desired operating speed of free-flowing traffic, and must essentially be higher than existing actual speeds in order to justify the superior type facility.

Speeds on existing streets will increase as their traffic loads decrease due to diversion of traffic to the expressway, but this can be ignored (in the analysis of divertable traffic) since the primary purpose of expressways is to relieve congestion at present.

Based on the assumption that average speeds on the expressway would be 40 m.p.h. then 20 m.p.h. would be the basis for adjusting distance on existing streets, if the ratio of 2:1 was to be maintained.

Speed Ratios for Expressways and Local Streets To Obtain Relative Values

Existing streets Average m.p.h.	(1) Ratio applied to existing feeder streets. Distance on basis of 20 m.ph.	(2) Ratio applied to expressway distance
40	2.00	1.00
35	1.75	0.88
30	1.50	0.75
25	1.25	0.63
20	1.00	0.50
15	0.75	0.38
10	0.50	0.25
5	0.25	0.13

In order to determine relative values in distance on the expressway compared to existing streets, where the 2 to 1 ratio could not be maintained, the following considerations are suggested for the purpose of eliminating various charts for different speed ratios. Many such graphs would be necessary if all possible ratios were to be considered. Maintenance of the 2:1 ratio would simplify the overall effort considerably.

Adjustment of existing feeder street distances on the basis of average speeds would be by the formula:

$$\frac{\text{Average m.p.h. on existing feeder street}}{20}$$

The various ratios are shown in col. (1) of the accompanying table. They could then be applied to the measured distances for the "Origin to Expressway" and "Expressway to Destination" on existing streets only.

To ascertain the relative speed and distance on those sections of the expressway which would be used in lieu of existing streets the formula:

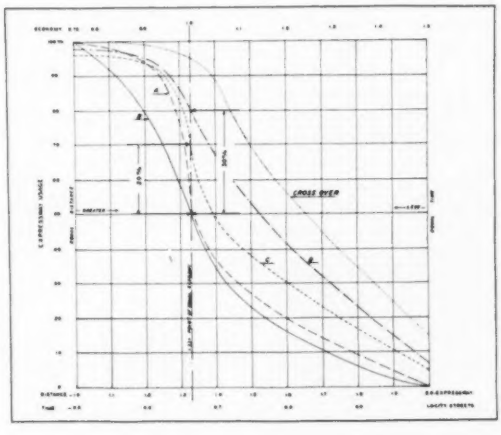
$$\frac{\text{Average m.p.h. on streets used in lieu of expressway.}}{40}$$

could be used and the resulting ratios of speed to distance are shown in col. (2) of the table. These, when applied to the Expressway Distance factor in the Figure, would furnish the adjusted value of the expressway distance compared to the alternate choice of streets on the basis of the 2:1 ratio. In other words, unity on the feeder streets would be at the point where the average m.p.h. was 20. The expressway sections used in preference to the choice of existing streets would reach unity only when the choice of those existing street speeds reflected 40 m.p.h. It is believed that this method of time-distance adjustment is well worth using in view of the man-hours saved when adapting the data to a route dollar-value analysis.

A map showing varying speeds, as developed by speed and delay studies would necessarily be an integral part of traffic assignment studies. These are usually prepared so that off-peak and peak-hour speeds are shown separately. Neither off-peak or peak-speed maps alone can be used to determine the average speed on a given street. Therefore, an average speed map must be prepared that will reflect average conditions for a 24 hour period. This can be accomplished by using the relationship between the total 24 hour and the two peak hour volumes. In the Phoenix Area Survey it was found that 16 per cent of the total traffic occurred between the two peak hours 8:00 to 9:00 A.M. and 5:00 to 6:00 P.M. The following formula would apply for the purpose of averaging the two speed rates:

$$\frac{(\%\text{ of Peak-hour x Speed m.p.h.}) + (\%\text{ of Off-peak hour x speed m.p.h.})}{100}$$

From a tabulation based on the formula as applied to varying speeds, the data for an average driving speed map could readily be assembled.



TRAFFIC NEWS

Electronic Untangler For Denver's Traffic

By Henry A. Barnes (Mem., ITE)
Director, Traffic Engineering Division
City of Denver, Colorado

Employing a revolutionary combination of fixed-time-cycle and electronic traffic control equipment, the City of Denver, Colo., has launched a sweeping $125,000 modernization of its entire downtown network of traffic signals and controllers.

Under the new system, manual adjustments and human guesswork in timing signals to handle irregular traffic fluctuations will be completely eliminated. Initially, the installation will include 104 General Electric Type F traffic controllers to be supervised electronically by a master cycle selector.

All controller dial units and the master selector will be remotely housed on a central control panel in Denver's City and County Building, and individually connected to the controller switching mechanisms in control boxes at 104 downtown intersections.

Replacing a 20-year-old installation operated by a single General Electric Type TSM, fixed time controller, the new system will provide a degree of flexibility never before achieved in Denver's traffic. In place of predetermined, fixed time cycles, any cycle timing between 40 and 125 seconds as well as red-green light percentages will be electronically adjusted to meet downtown traffic counts which register automatically through under-street pressure pads at four representative intersections.

Every six minutes, the electronic master selector will add up this traffic count, compute the proper timing cycle and red-green splits to handle the traffic flow, and then automatically adjust the 104 individual controllers by varying the voltage and frequency on their synchronous drive motors. Adjustments of the cycle are limited to 5-second increments every six minutes to avoid sudden large changes in cycle timing.

Offsets on the controller dial units also can favor traffic entering the downtown section during morning rush hours and outgoing traffic in the evening. In addition, percentage splits of red and green can automatically reverse between main and side streets as traffic flow dictates.

Thus, completely automatic traffic control will be provided at all times, regardless of traffic fluctuations caused by stores, movie rush hours, parades, etc.

In addition to greatly improved traffic flow, the new system also provides a pedestrian walk period with traffic stopped and pedestrians moving in all directions. As vehicular traffic demands a longer timing period, the same demand will be reflected and compensated for in the pedestrian walk period.

The central control panel, to be constructed in General Electric's Denver Service Shop, will eventually accommodate controller dial units for 155 intersections and the remote control feature ultimately may be expanded to 250 key intersections.

Connections from dial units to switching mechanisms at each intersection are made individually through 90 volt D.C. relays and multi-connector cable installed in telephone company conduit. Primary 110 volt, 60 cycle current supplies the electronic master and frequency changer which drives the 104 Type F controllers, while a General Electric 60 amp, 80 to 100 volt selenium rectifier provides direct current to operate the switching relays at each intersection.

With a new system geared fundamentally to the control of traffic rather than operating lights, Denver is taking a major step toward the solution of its crippling downtown traffic congestion problem.

Since the program represents a complete reconstruction of existing control facilities, it will require about 1½ years for completion. However, individual controllers, with dial units remaining in the control box, will be placed into operation as equipment arrives. Thus, the failure of a single controller will affect only one intersection, not the entire downtown area, as at present, which means immediate benefits to the community.

Engineers' Bulletin

Cleveland Not on Course Set For Ohio Road

The Ohio Turnpike Commission has decided it would cost too much to run its toll highway closer to Cleveland. Recently members approved a route across Northern Ohio recommended by State Highway Director T. J. Kauer and rejected a plan to swing the toll road within 17½ miles of Cleveland's City Hall. The route approved by the commission is a mile wide band across the state. The road would be located within that band if further surveys this year show it is feasible.

MEMBERSHIP INFORMATION
may be obtained by writing to:
Executive Secretary
Institute of Traffic Engineers
Strathcona Hall
New Haven 11, Connecticut

New Bus Terminal In Manhattan

All of the commuter buses entering mid-Manhattan will use the $24,000,000 Port Authority Bus Terminal, a block from Times Square on Eighth Avenue, when it opens about December 15. At least one-third of the long distance bus traffic will also be handled at the new union bus station, the largest of its kind in the world, at that time.

Chairman Cullman, of the Port of New York Authority, revealed that intercity bus carriers operating 4,570 out of a total of 5,070 bus arrivals and departures from midtown Manhattan daily have applied for space at the Port Authority Bus Terminal. All of the nineteen companies operating intercity commuter service and ten of the twenty-five long distance bus operators have filed applications for bus terminal tenancy. The long distance applicants represent about one-half of the total daily departures of long distance buses from the center of the city, not including Greyhound buses, and one-third of the total including Greyhound. A number of the long-haul operators who have not already applied for space in the great new Port Authority facility have indicated that they will be interested in using the terminal as soon as they can adjust their existing bus station leases, or make other necessary changes in their operations.

The Port Authority previously announced that concession space in the huge terminal, rental of which is expected to contribute more than fifty per cent of total revenue, is eighty-five per cent taken.

When the bus terminal is in operation streets in the center of Manhattan will be considerably relieved from the intolerable congestion caused by the travel over crowded city streets of the huge intercity buses enroute to their various bus stations east of Eighth Avenue. Of equal significance in the measure of public service that will be provided by the bus terminal is the convenience to the more than 170,000 New Jersey bus commuters and long distance bus travelers who, for the first time, will be spared a loss of time of from six to twenty minutes in bus travel through crowded Manhattan streets, and inadequate, uncomfortable bus station facilities.

The immediate tenancy of all short-haul bus lines and a large part of the long-haul companies will result in about 875,000 bus departures at the terminal during the first year. It will therefore be possible, according to Mr. Cullman, for the Port Authority to charge fifty cents per departure for the use of the terminal. This compares with sixty cents per departure which would have been the required fee until a volume of 875,000 was reached.

Artist's rendering of air view of Port Authority Bus Terminal and Parking Roof. Drawing illustrates ramp approaches and exits to Lincoln Tunnel plaza. Use of ramps to bus loading and unloading areas in Port Authority Bus Terminal, west of Eighth Avenue, will end movement over congested New York streets of all intercity commuting buses entering and departing from midtown. Lower left: Lincoln Tunnel entrance plaza to New Jersey. Upper right: Lincoln Tunnel exit plaza to New York.

1950 Federal-Aid Highway Act

The proposed 1950 Highway Act, as approved by both houses of Congress, has been sent to the White House for Presidential approval. Since it coincides largely with Administration policy, its signing is expected.

The new law, the outcome of original bills H. R. 7941 and S. 3424, authorizes $500 million annually for the federal-aid system, to cover fiscal years ending in June, 1952, and June, 1953. The 1948 Act authorizes $450 million annually.

Original bills contained the following innovations which were amended out of the final legislation:

1. Considerably increased level of federal aid
2. Increased federal share of 75 per cent on interstate highway finance
3. A new authorization for purely local rural roads

Other items stricken included a provision allowing shifting of all funds to national defense in event of a national emergency as well as a special $70 million for interstate highways. The law does contain a new provision permitting states and local governments to use federal-aid funds to retire road construction bonds, a provision severely criticized by President Truman. Earlier the Senate killed a proposed amendment which would have denied funds to states permitting vehicles with more than 18,000 lbs. per axle on federal-aid roads.

"Military Traffic Service" Headed by Edward Plowman

A new staff office in the Defense Department to deal with military transportation and the problems that are confronting business and industry in the movement of critical military material has begun functioning.

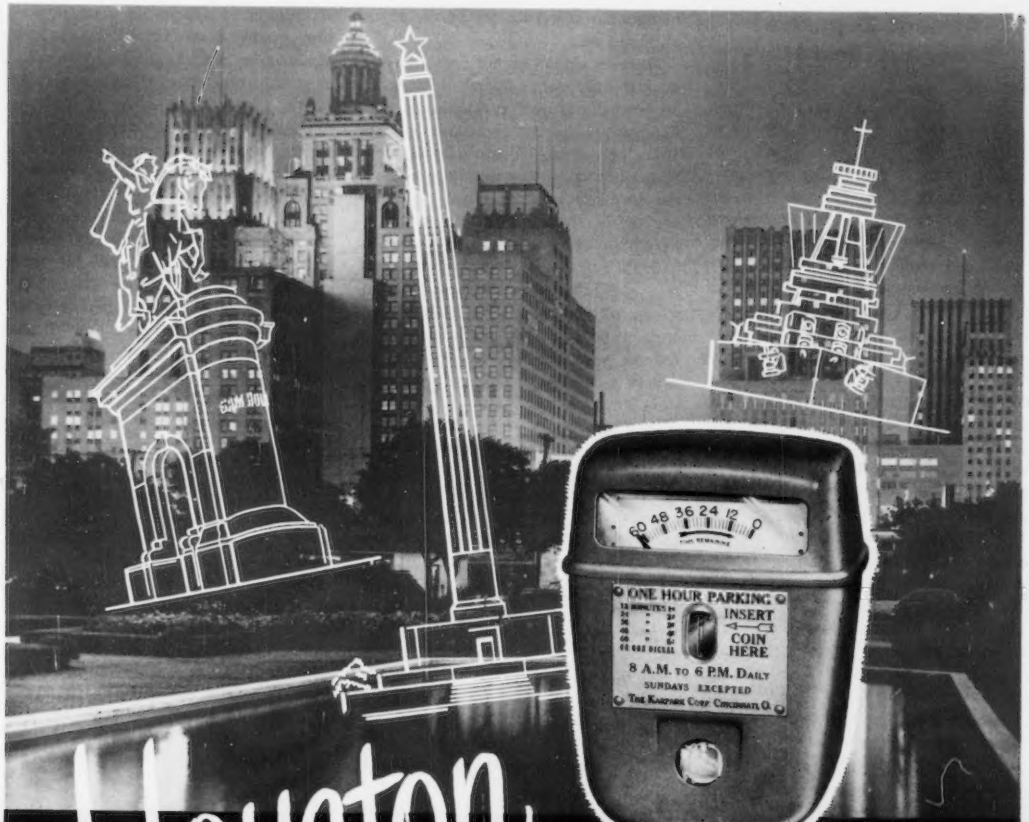
Edward G. Plowman, a vice-president of the U. S. Steel Corporation, who was named by Secretary Johnson to head up this organization, is already at work in his headquarters in the Pentagon Building. His office will work closely with the Munitions Board, which will be advisory on rate matters, and with the Joint Military Transportation Committee (of the Joint Chiefs of Staff), which will be advisory on coordination and requirements.

The Joint Military Transportation Committee is composed of Major General Frank A. Heileman, Army; Major General William E. Farthing, Air Force; and Rear Admiral Thurber, Navy.

Hebden, Norman and Smith, Wilbur S.

State-City Relationships in Highway Affairs. New Haven, Yale University Press, 1950. 230 pp.

Correction: Norman Hebden and Wilbur S. Smith are the authors, not editors as was stated in the review of the book on page 476 of the September issue.



Houston ADVANCES WITH KARPARK

Vision — the vision of civic officials and leaders — has characterized every activity in the development of Houston's sound and gigantic growth. In selecting the parking meter for the city's comprehensive traffic control system, far-sighted officials made certain of avoiding the endless costs of impact breakage, vandalism, and frequent windings and repairs, by choosing the vast strength and utter dependability of the steel head KARPARK "Superior". For particulars about this, and other KARPARKS, write today.

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HUSKY TWIN-O-MATIC UNIMATIC

KARPARK *Automatics*

Manufactured by The Herschede Hall Clock Company
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Annual Report of Executive Secretary

General

Your Executive Secretary's report for the year October 1, 1949 to September 30, 1950 will reflect, for the first time in four years, *Institute* operations on a self-sustaining basis. The past year has been a critical one in this regard, but we have come through with flying colors and remain on a solid financial footing as evidenced in the report of your Secretary-Treasurer. The accelerated growth and expansion of the *Institute* assures continuing advancement and progress with the security that comes from financial stability. This favorable outlook would have been impossible without the cooperative teamwork of the membership, the Board of Direction and your national headquarters staff.

It is obvious that a report of this nature cannot include all of the many details incident to the administration and operation of Institute affairs. Your "Secretary's Column" and the Traffic News section of "Traffic Engineering" magazine, occasional news letters, and official communications to the voting members, provides an excellent opportunity for monthly and quarterly reports to the membership. Through these mediums major administrative and policy matters relating to management of the affairs of the *Institute*, based on action of your Board of Direction were reported. Five meetings of the Board were held as follows:

September 26, 1949—Washington, D. C.

December 13, 1949—Washington, D. C.

March 5, 1950—Memphis, Tennessee

June 23-24, 1950—Balsam Lake, Wisconsin

September 24, 1950—New York, New York

The activities of your various committees will be reported by the respective chairmen. This report, therefore, will concern itself with a general review of Board and Local Section activity, the services and operation of national headquarters, and such other matters that will not be covered in other reports.

Headquarters Operation

There have been no changes in your headquarters staff during the past year. The extremely capable and efficient work of Miss Ann Lincoln, Miss Bridget Pellegrino, and Miss Anne Leftwich, made it possible for your Executive Secretary to maintain the pace set by the Board of Direction.

The most significant developments during the past year included: (1) detailing the duties and functions of your Executive Secretary (reported on page 361, June issue, "Traffic Engineering" magazine) as a continuing guide for the Secretary and the Board of Direction; (2) bonding the position of Executive Secretary in the amount of $10,000.00, in view of his delegated responsibilities in connection with Institute accounts; (3) the establishment of new bookkeeping and account procedures with the assistance of an accounting consultant; and (4) authorization for a continuing commercial audit of Institute books at the close of each fiscal year. In connection with the latter, the Board has submitted a proposed amendment to the *Institute* By-Laws, for consideration and vote of the membership, which will change the fiscal year to conform with the calendar year. This important change will place the Board of Direction in a better position to determine anticipated revenues—principally from "Traffic Engineering" magazine advertising—and adopt a sound budget for the coming year. This change will in no way affect the *Institute* year as it pertains to election, annual meetings, new committee appointments, etc.

Personnel Services

The traffic engineering profession continues to enjoy the enviable position of having a greater demand for qualified men than we can supply. With few exceptions, every new position filled in one location leaves a vacancy elsewhere. During the past year, your national headquarters was directly or indirectly responsible for the placement of 25 members and graduate students in new positions. There still remain several position vacancies on file at *Institute* Headquarters. Approximately 30 names of members and graduate students are currently maintained in a confidential file for prospective employers. The principal reason for failure to close the gap between prospective employers and employees continues to be a salary problem.

In order to provide more "ammunition" for national headquarters in its recommendations to cities on equitable salary ranges, a confidential questionnaire was submitted to 65 selected city traffic engineers, all of whom were members of the Institute. The gratifying 90% return has enabled your Executive Secretary to prepare a table of recommended salaries in four population groups. New departments, and reorganization of existing departments generally conform to the recommended ranges. Every effort is being made to maintain a high standard of salary ranges commensurate with other comparable positions in the government structure.

Your national headquarters maintains a confidential listing of 50 individuals and firms interested in full or part-time consultant work. Identical lists are furnished the U. S. Chamber of Commerce, the National Safety Council and the American Automobile Association. This distribution provides for adequate handling of weekly inquiries from official and non-official groups seeking consultant services.

Membership

The past year marks the largest net increase in membership in the history of the *Institute*. During the year 80 new members and 31 transfers in grade were approved by the Board of Direction; 2 members died; 2 resigned; and 2 were dropped for non-payment of dues. Board action on membership during the year at various meetings was as follows:

	New Members	Transfers	Resigned	Dropped
9/25/49	26	6	2	—
9/26/49	2	2	—	—
12/13/49	15	1	—	2
3/5/50	19	5	—	—
6/24/50	15	14	—	—
7/21/50 (Letter Ballot)	3	3	—	—
	—	—	—	—
	80	31	2	2

At the beginning of the Institute year there were 459 members. The total membership at the present time is, therefore 533. It is significant that there were only 2 resignations (one of them a foreign member) and that only two members were dropped for non-payment of dues. Of the latter two, one of them has already requested reinstatement. This is convincing evidence that the membership intend to "stay on the team" and support the growth of the organization and the profession.

The large number of transfers at the June meeting of the Board reflects the special consideration and transfer, by invitation of the Board, of seven Affiliates to Member or Associate Member grade. This action was the result of a careful screening of all Affiliates in line with recommendations of the Board for constitutional changes in the requirements for the Affiliate grade.

It is interesting to note the trend in membership distribution. A large major-

ity of the new members represent Federal, State, County or City Governmental Departments. An analysis over recent years shows a steady growth of membership in this category and a decline in non-governmental organizations.

Publications

ITE Technical Bulletins

As will be reported by the Chairman of ITE Technical Committee No. 4—Design of Equipment, a revision of Technical Bulletin No. 1—"Adjustable Face Traffic Control Signal Head Standards"—was completed during the past year. Pending this revision a quantity of the first edition was purchased during the past year to accommodate the demand. It is understood that the committee has also undertaken revision of Technical Bulletin No. 2—"Pre-Timed, Fixed Cycle, Traffic Signal Controllers." Technical Bulletin No. 3—"Traffic-Actuated, Traffic Signal Controllers" is currently being processed by the American Standards Association, and will be available during the coming year.

Proceedings

Approximately 400 copies of the 1949 Proceedings, a volume consisting of 112 pages, and approximately 200 copies of prior issues were sold during the past year. For the first time in several years, the *Institute* realized a small profit from these sales. Editor Charles S. LeCraw Jr., with the assistance of Associate Editor S. T. Siegel, performed a creditable service in carrying on the fine work of the late William B. Powell.

"Traffic Engineering"

At the beginning of the year it appeared that the editorial staff of "Traffic Engineering" magazine was faced with the insurmountable task of meeting budgetary obligations for this publication. However, the untiring efforts of the Managing Editor resulted in exceeding the established advertising budget. Circulation gains have been made and increasing efforts are being made to promote new subscriptions. "Traffic Engineering" was listed for the first time in Standard Rate and Data Service Catalogue last May. Due to the importance of this listing and the increased recognition gained thereby, further expansion in advertising and circulation is anticipated.

It is important for the membership to understand that "Traffic Engineering" is the major source of income for the organization. It therefore behooves each and every member to make an individual effort to solicit advertising and subscriptions. Many manufacturers of traffic control equipment do not understand the value of advertising in "Traffic Engineering" because their major purchasers, members of the *Institute*, do not bring this fact to their attention. No attempt will be made in this report to repeat the facts and figures, aims and objectives of your editor as outlined in the "Frankly Speaking" editorial of the September issue. If every member would obtain *one* subscription during the year and mention "Traffic Engineering" when purchasing equipment from active or prospective advertisers, the gain wou'd more than assure the continued success of this publication.

Traffic Engineering Handbook

After several years of hard work on the part of individual members of the *Institute*, the 1950 edition of Traffic Engineering Handbook is now a reality. Advance orders indicate a large initial distribution. A procedure similar to that utilized with the first edition has been established for handling orders through the Association of Casualty & Surety Companies. Based on tremendous increase in printing costs, the Board of Direction set an equitable scale of prices for sale of this publication. It is hoped that initial costs can be underwritten the first year, thus assuring the Institute an added source of revenue in the future.

Although the title pages of the Handbook express due appreciation to all persons responsible for the 1950 edition, your attention is especially invited to the untiring efforts and splendid contribution of the following. Graham Cole and his original Handbook committee, which set the stage for production of the revised edition; editor Henry K. Evans for his tremendous single-handed task of compilation, correlation, coordination and editing of original manuscripts; the administrative, policy and editorial guidance of Bob Mitchell and his Editorial Board; the wise counsel and advice of Julien Harvey and his gracious deference to the Institute as sole publisher; the work of Bob Allen, under Mr. Harvey's supervision, in correlating and handling the many intricate mechanical details incident to promotion, printing, handling, and distribution; and to each of the 16 Associate Editors whose efforts made the revised text possible.

Yearbook

The 1949-1950 Yearbook contained a few minor improvements over the previous edition. Due to an unprecedented demand, the Yearbook has been given wider distribution during the past year. It has become a valuable reference source, not only for members, but for prospective members, other national and international organizations, municipal officials, local chambers of commerce, and many other interested groups.

(To Be Continued in December Issue)

Diversion of New Vehicle Tax Asked in Oregon

A tax study committee created by the Oregon board of control has called for an additional tax on motor vehicles as a means of augmenting state revenues. The proposal asks that proceeds be placed in the general fund, despite the fact that the state has an anti-diversion amendment.

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Military Reserve Deferment Policy Issued

To have his request for temporary deferment of active duty considered a military reservist must be a key worker in a critical occupation and be employed in an essential activity.

This is the substance of interim reserve deferment policies prepared by the Personnel Policy Board of the Department of Defense for guidance of the affected military departments in handling requests for delay in reporting to active duty of Army, Navy, Air Force and Marine Corps reserves and members of the National Guard. The directive was announced by the Secretary of Defense recently.

The policy statement does not apply to induction of men under the Selective Service Act. Local Selective Service Boards determine questions of deferment of individual selectees.

Jobs, Activities Listed

To guide the military departments in determining whether a man fits the conditions set forth by the policy statement, advisory tentative lists of some 100 "critical occupations" and 72 "essential activities" have been issued by the Departments of Labor and Commerce respectively.

Activities tentatively selected as essential by the Department of Commerce are industries that: (1) contribute directly to war materials production; or (2) are necessary to maintenance of such production; or (3) are essential to national safety, health and interest.

Occupations designated as critical by the Department of Labor are those where: (1) demand for qualified persons in essential industries would exceed supply under full mobilization; and (2) two years' minimum training or work experience is required for satisfactory performance; and (3) the occupation is essential to the industry in which it occurs. (All three conditions must be met.)

No Guaranteed Exemption

These lists are advisory only. There is, of course, no guarantee that a worker with a listed job in a listed industry will be deferred, nor will deferment mean indefinite exemption from military service.

A reservist will be deferred only until he can be replaced in his job, with maximum initial deferment of six months. Requests for renewal deferments up to six months may be considered but the Secretary has directed that stricter application of the criteria be made in evaluating requests for renewals. Deferments will be made on an individual basis only and may be ended at any time because of "overriding military necessity."

Employer May Apply

Deferments for dependency are not included in the criteria but it is the announced policy of the military departments to give consideration to hardship cases.

Application for deferment may be made by a member of the reserves or his employer. Applications must be in writing.

Requests for delay in call should be addressed as follows:

Army Organized Reserve Corps—Through unit commander or unit instructor to the Commanding General of Army area in which reservist resides.

Naval Reserve—Officers: Chief, Bureau of Naval Personnel, Washington 25, D. C. (Non-aviators' requests via their Naval District Commandant, Aviation officers' requests via Chief of Naval Air Reserve Training, Naval Air Station, Glenview, Ill.) Enlisted non-aviation personnel: to the Naval District Commandant. Enlisted aviation personnel: Chief, Naval Air Station, Glenview, Ill.

Marine Corps—Through the chain of command, starting with the local inspector-instructor.

Air Force—Headquarters of the numbered Air Force for the area in which the reservist resides.

National Guard—Adjutant General of the state concerned.

Copies of the three official documents named can be obtained as follows: Statement of the Secretary of Defense—Office of Public Information, Department of Defense; Tentative List of Essential Activities—Department of Commerce; List of Critical Occupations—Department of Labor. All may be addressed Washington 25, D. C.

Business Action

The acquisition of property for a 173 by 162 foot parking area in Beaver Dam, Wisconsin, has been completed. A $75,000 issue of mortgage revenue bonds has been authorized to finance the parking area. The bonds will be retired from parking meter revenues.

THE MUNICIPALITY

HRB Committee to Study Highway Administration

Harmer E. Davis, director of the Institute of Transportation and Traffic Engineering at the University of California, has been named chairman of the Highway Research Board's Committee on Highway Organization and Administration.

Broad purpose of this Committee is to study the organization and management of highway activities on all government levels with respect to organizational forms, efficiency, extent of jurisdiction, and specific functions.

Other members of the Committee are Hal H. Hale, executive secretary, American Assoc. of State Highway Officials; G. Donald Kennedy (Mem., ITE), consulting engineer and assistant to the president, Portland Cement Assoc.; Donoh W. Hanks, assistant director, American Municipal Assoc.; Norman Hebden, Bureau of Highway Traffic, Yale University; C. M. Nelson, editor, BETTER ROADS; Ben H. Petty, professor of Highway Engineering, Purdue University; L. S. Tuttle (Assoc. Mem., ITE), assistant to the commissioner, U. S. Bureau of Public Roads; and W. L. Haas, U. S. Bureau of Public Roads, secretary of the committee.

Merger of Consulting Firm

Merger of the firms of Edwards and Kelcey, and Lawrence T. Beck and Associates, consulting engineers, into a new partnership of Dean G. Edwards, Guy Kelcey and Lawrence T. Beck, was announced recently.

The new firm, to be known as Edwards, Kelcey and Beck, will specialize in modern expressway, traffic, terminal, transportation, sanitation and water supply problems. Offices will be maintained at 250 Park Avenue, New York, and 3 William Street, Newark, N. J.

Edwards and Kelcey during the past five years have engaged extensively in designing and supervising the construction of modern expressways in addition to other traffic and transportation engineering. Their activities have covered a substantial portion of the eastern section of the country and have included work on express highways in New York City, the East Boston Expressway, the Milwaukee, Wis., expressways system and the northern section of the toll highway under construction by the New Jersey Turnpike Authority.

The firm also has served as consultant to the Port of New York Authority, the New Jersey State Highways Department and the New York City Citizens Budget Commission on vehicular traffic, airports, water supply and waterfront development in the Metropolitan area.

Lawrence T. Beck and Associates have served as consultants to the South Carolina State Ports Authority, and were consulting engineers, jointly with Edwards and Kelcey, on the Citizens Budget Commission's proposed Hudson River water supply project for New York City.

Successor to Lawrence T. Beck and Company, of London, Jerusalem and Dallas, the Beck organizations have an impressive engineering record on port, harbor, railway and water supply developments in the British Isles, the Near East and Middle East as well as in the United States.

The combined experience of the two organizations operating as one firm will make possible substantially expanded activities in both this country and abroad, Mr. Edwards announced.

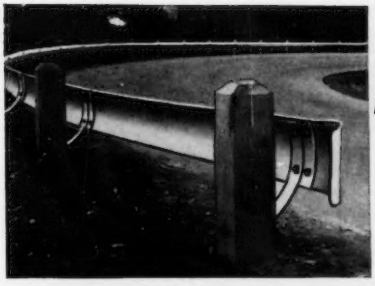
ON THE SHELF

Compiled by
Mrs. Kathryn Cassidy, Librarian
Yale Bureau of Highway Traffic

National Committee on Uniform Traffic Laws and Ordinances.
Regulation of Vehicle Operation on Highways; Explanatory Notes on Act V of the Uniform Vehicle Code. Washington, D. C. The Committee, 1949.

National Committee on Uniform Traffic Laws and Ordinances.
The Uniform Vehicle Code Common Sense Laws to Eliminate Traffic Confusion in Your State. Washington, D. C. A leaflet outlining the contents of each act of the Uniform Vehicle Code and advocating briefly but emphatically the reasons for wider adoption of the code.

State and Local Officials' National Highway Safety Committee.
Summary of State Legislative Action in 1949 in the Field of the Uniform Vehicle Code. Washington, D. C., November 1949. Prepared in cooperation with Bureau of Public Roads, U. S. Department of Commerce and National Committee on Uniform Traffic Laws and Ordinances.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Transeau, T. Elmer.

Speed! Public Enemy Number One. A Realistic Approach to the Rural Highway Traffic Death Problem. Pennsylvania, Bureau of Highway Safety, 1950. 14p., pamphlet. A brief but thoughtful analysis of some statistics of the accident rate on rural highways. Mr. Transeau points out that although the death rates based on mileage estimates are steadily going down, the death total for the nation is being reduced very slowly and that on rural highways scarcely at all. Since too great speed "for the conditions" is most commonly the cause of accident on highways outside of urban areas, Mr. Transeau has proposed a remedial program which he believes should be more forcefully followed than has been done heretofore.

Washington (state), Design Standards Committee.

Design Standards for Major and Secondary City Streets: Instructions for Determining Practical Working Capacities. Published by the Bureau of Governmental Research and Services, University of Washington, in cooperation with Association of Washington Cities. Charts and instructions for determining the capacities for two-way and one-way urban streets in terms of total vehicles per hour.

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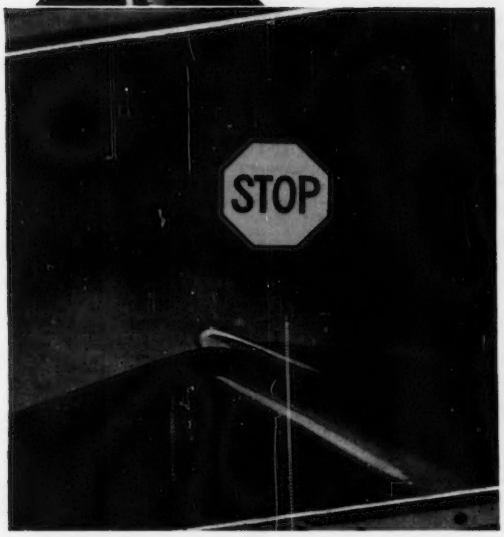

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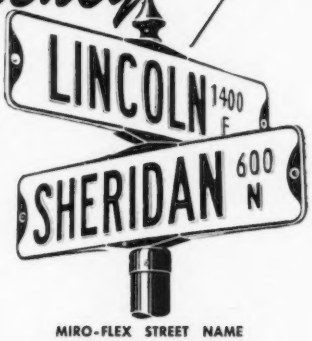

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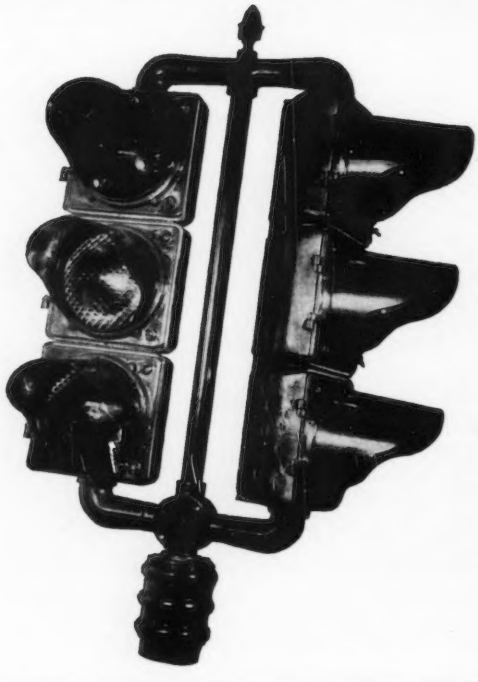

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